Astromaterials Curation

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Astromaterials curation is the cornerstone of the NASA Cosmochemistry research program. Astromaterials Research and Exploration Science (ARES) staff curates the existing collections and distributes them to researchers worldwide to investigate the origin and evolution of the solar system.

The Apollo astronauts collected 2196 Moon rock and soil samples having a total mass of 382 kilograms, the only documented samples yet returned from another body in the solar system. Johnson Space Center (JSC) Astromaterials staff curates this national treasure in the Lunar Sample Facility, a suite of Class 1000 cleanrooms and secure vaults constructed in 1979. The collection now comprises approximately 100,000 sub-samples, many of which are located in research laboratories and museums worldwide. The bulk of the collection, including pristine samples and material returned following analysis, is stored at the JSC facility. Even 30 years after the Apollo missions, lunar sample research is active, with new techniques yielding new insights into the history of the Earth-Moon system.

Lunar sample laboratory.

Antarctic meteorite collection.

Meteorites are rocks from space that have fallen on Earth. Since 1976, the U.S. has sent yearly expeditions to Antarctica to recover meteorites. (Glacial movement concentrates meteorites on icefields near mountain ranges.) The Antarctic Meteorite Program is a collaboration between the National Science Foundation (NSF), Smithsonian Institution (SI), and NASA, in which NSF is responsible for collection and NASA and SI share curation duties. The ARES role is initial description, temporary storage, and distribution of samples to investigators, performed in a dedicated suite of Class 1000 cleanrooms. The meteorites are eventually sent to the SI for permanent storage after demand for an individual sample has decreased, but JSC curates over 4,000 specimens at any one time. The number of new samples

collected by a single field team and delivered to JSC each year has ranged from approximately 200 to well over 1000, including five meteorites from Mars and eight meteorites from the Moon. The 2002–2003 team returned 925 new meteorites from the ice.

Microscopic particles of comets and asteroids, captured by the Earth and suspended in the stratosphere, are collected by dedicated equipment on two NASA aircraft. The collectors are prepared at JSC and returned to the JSC Cosmic Dust Laboratory, a Class 100 cleanroom, where individual particles are retrieved, documented, and distributed to researchers. The Cosmic Dust program has operated since 1981.

Since 1970, JSC has prepared and distributed a diverse collection of materials exposed to the space environment. These have included pieces of the Surveyor 3 spacecraft sampled by the Apollo 12 astronauts, the Long-Duration Exposure Facility, several commercial satellites retrieved by the Space Shuttle, and materials from the Mir space station. Documentation and curation of these materials is done in the Facility for Optical Inspection of Large Surfaces.